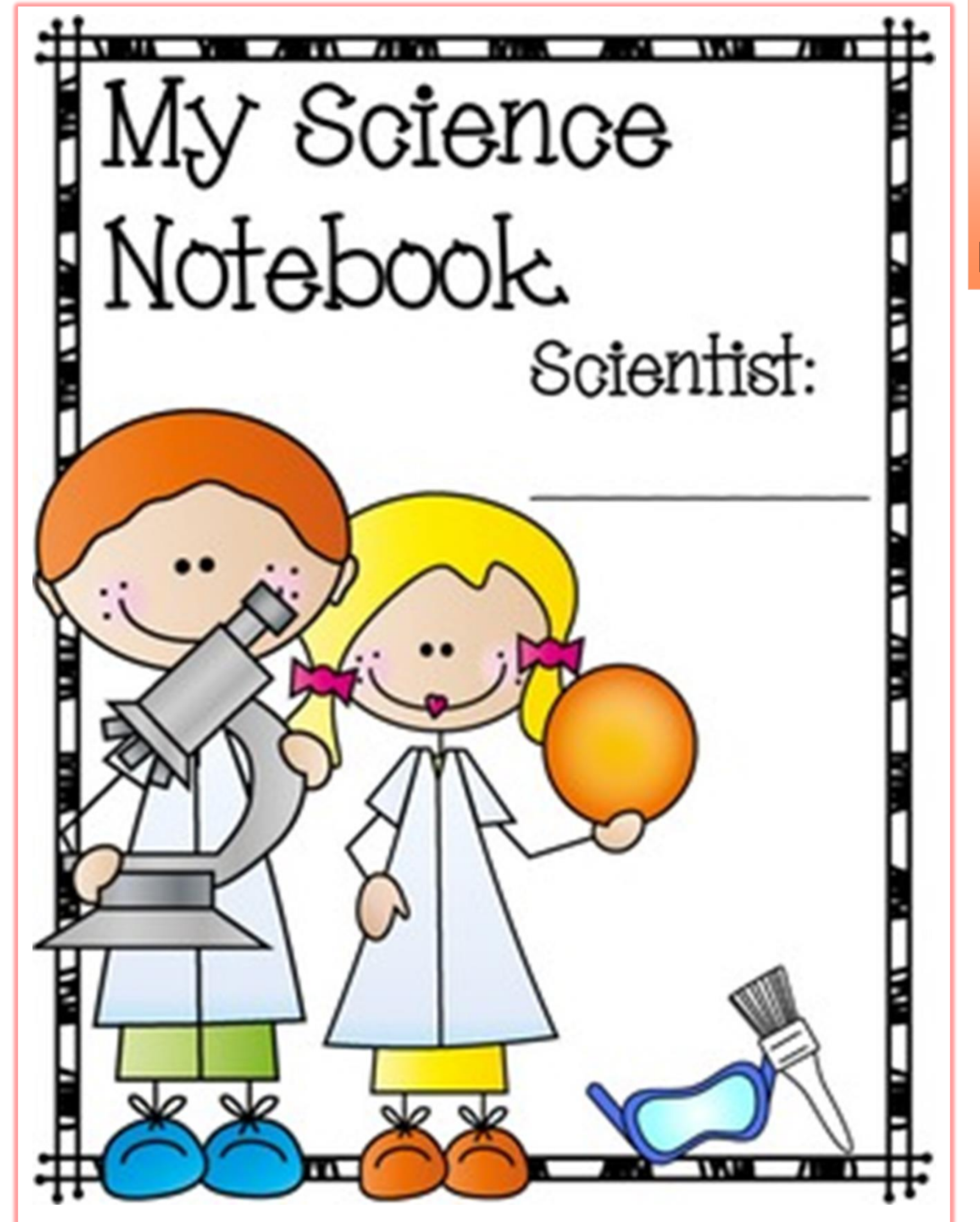


6th Primary

2025

Science Booklet

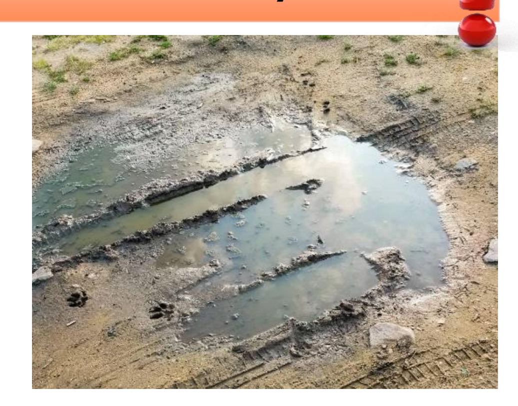
Second term

2024-2025

Lesson 

What happen when a small water puddle is heated by Sun?

It **evaporates** and changes into water vapor, **so** the small puddle is dried up and disappeared.

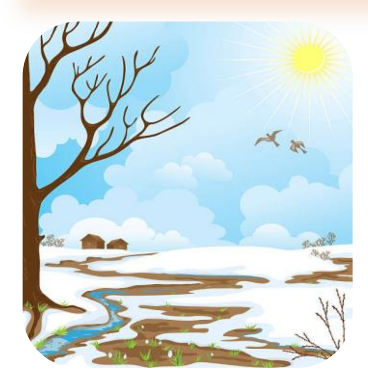


➢ Water exists in 3 states:-

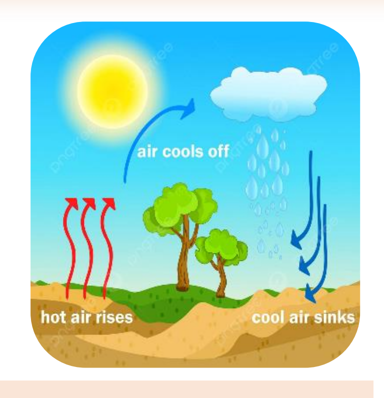
1. Solid (ice)
2. Liquid (water)
3. Gas (Water Vapour)

- ➢ Water changes from one state to another when it gains or loses energy.
- ➢ The Sun is considered the most important source of energy that drives the water cycle.
- ➢ The amount of water remains constant due to the water cycle.

What is the role of sunlight, wind, water in transferring energy during the water cycle?



Sunlight melts ice and changes it into liquid water then into water vapor.



Sunlight provides the energy needed to generate the wind movement.



The wind causes **ocean currents** that transport water to different locations on Earth.

Dropping the water Level



► Energy transfer in the water cycle leads to increasing or decreasing the levels of water in some lakes.

- There was a **large salt** lake in **Turkey**, by passing time this lake became like a small puddle and sometimes it dries up completely in summer!
- This lake hosts huge numbers of **flamingos**.

Example:

Flamingos

They migrate and reproduce (breed) there when the weather is warm



Flamingos feed on algae that found in the shallow water of this lake

So, scientists try to discover ways to conserve and rehabilitate the ecosystem at this lake and protect it from climate changes

Energy Transfer in the water cycle

- **The steps and processes the affect the water cycle are:-**

1. evaporation
2. condensation
3. Precipitation.
4. **Runoff**
5. **Collection**

1–3: **The main 3 process**

4–5: **2 steps**

1 Evaporation
- It is the process in which matter changes from liquid state to gas state.

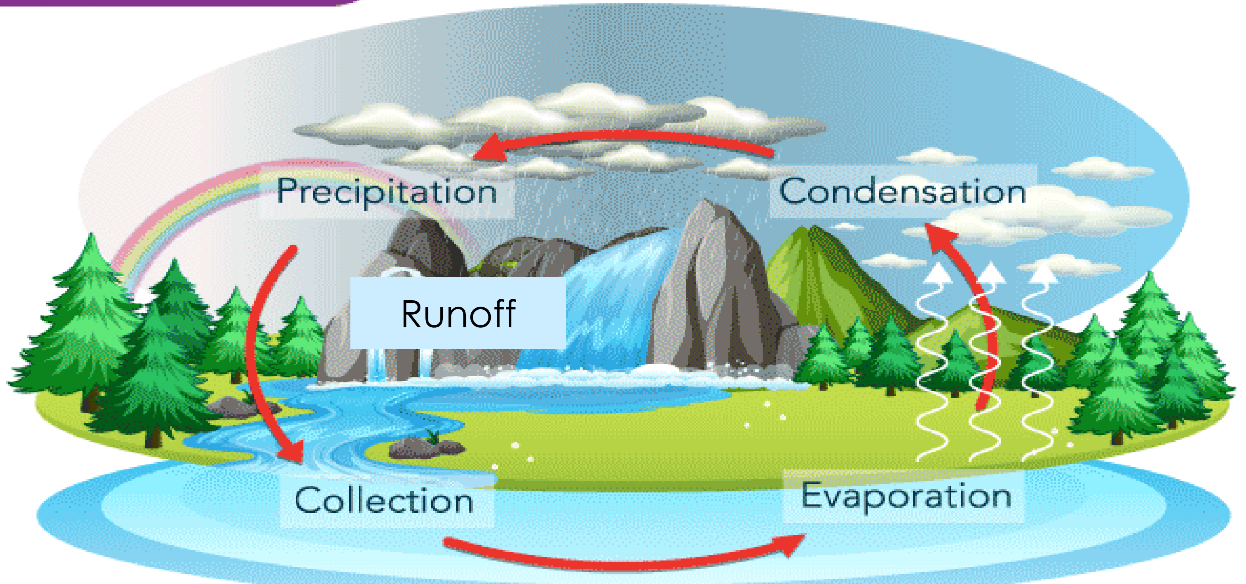
2 Condensation
- It is the process in which matter changes from gas state to liquid state

3 Precipitation
- It is the process in which water falls on Earth in the form of **rain**, **sleet**, **snow** or **hail (snow pellets).**

4 Runoff
- It is the step in which water flows along the Earth's surface into the river and then into the **ocean or sea**

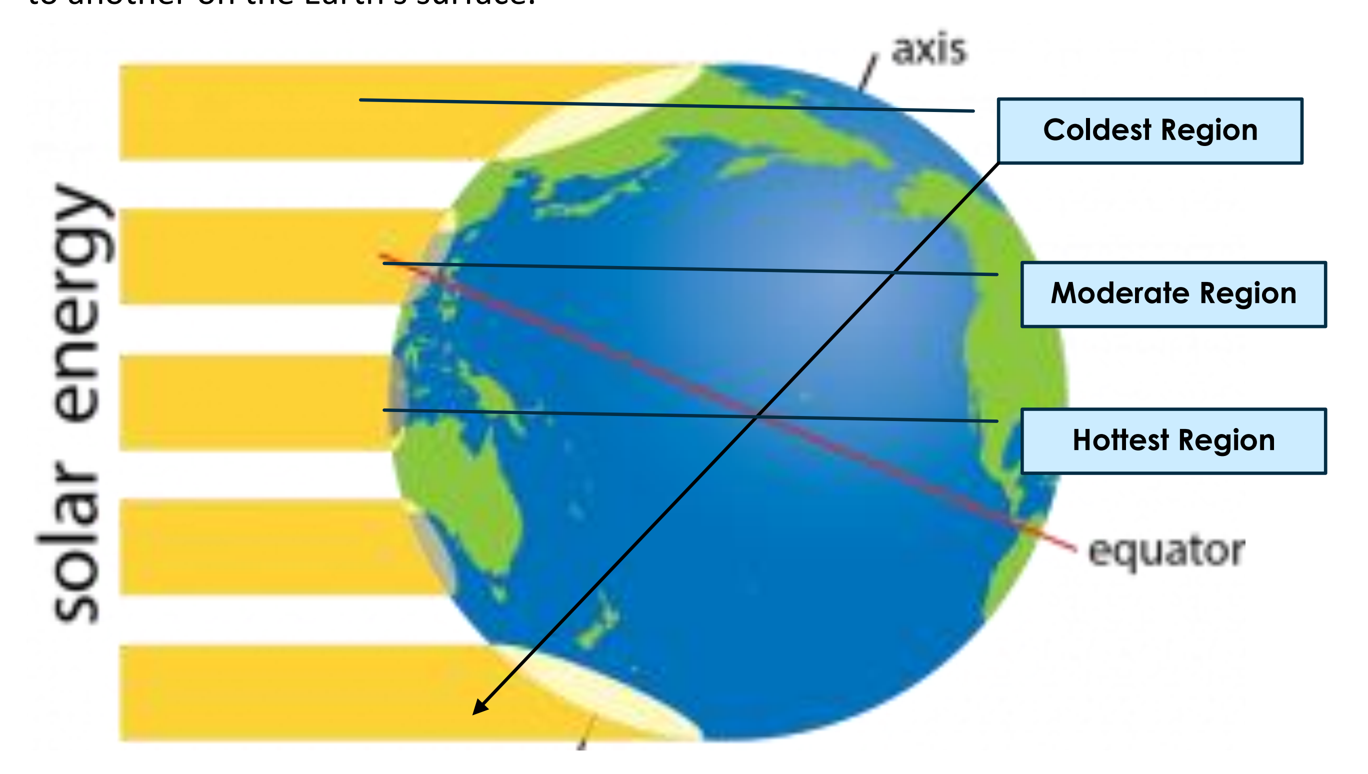
5 Collection
- It is the step in which rainwater falling on the Earth's surface is collected in diferent water bodies.





▶ Distribution of solar energy:

- The amount of the solar energy that reaches the Earth differs from one place to another on the Earth's surface.



We can classify the Earth into 3 different climate zones:-

- **Hottest regions:** They are regions in which the evaporation process is the greatest.
- **Moderate regions**: They are regions in which the evaporation process is moderate.
- **Coldest regions:** They are regions in which the evaporation process is the smallest.

Worksheet (1)

❶ Complete the following:-

1. Flamingos migrate to the large salt lake in Turkey when the weather becomes ……………and they are feed on………………which are found in this lake.
2. . Formation of fog is due to the……………of water vapor on a field in early morning.
3. The three main processes which are responsible for movement of water through the water reservoirs on the Earth are evaporation …………………and…………………………
4. Energy of the Sun causes the changing of liquid water into……………………..by evaporation
5. The amount of………………..energy that reaches the Earth affects the rate of evaporation process in the water cycle.

❷ Put true or false :-

1. Drying up of water in the large salt lake in Turkey is due to condensation process. (   )
2. Transferring of energy in the water cycle causes increasing and decreasing of water level in some lakes. (   )
3. Flamingos migrate to the large salt lake in Turkey when the weather is very cold there. (   )

❸ Write the scientific term of each of the following:

1. The main source of energy which affects the water cycle. (……………………)
2. It is the process in which water falls on Earth in the form of rain sleet, snow or hail. (……………………)
3. It is the process in which matter changes from liquid state to gas state (……………………)

❹ Give reasons for:

1. Drying up of the large salt lake in Turkey in summer season.

………

2. Formation of fog in the early morning.

……

Homework sheet

1 Choose the correct answer:-

1. **The large salt lake in Turkey is dried up due to the increase in the rate of……………………..process.**
   a. Melting b. freezing c. evaporation d. condensation
2. **Increasing and decreasing of water level in some lakes is due to the transfer of…………………… through the water cycle.**
   a. rocks b. energy c. work d. wind
3. **In winter, rain falls due to…………………process.**
   a. condensation b. evaporation
   c. collection d. precipitation
4. **When water runs through a river then into a sea, this step is called**…………………..
   a. runoff. b. condensation.
   c. precipitation. d. evaporation.
5. **The distribution of…………………energy on the Earth's surface plays an important role in evaporation process in the water cycle.**
   a. electrical b. solar c. sound d. kinetic
6. **Moderate regions are areas in which the evaporation process is……………**
   a. The greatest b. the smallest c. moderate. d. absent.

2 Put true or false :-

1-States of water change when water gains or loses energy. ( )

2-In the water cycle, the step that follows condensation process is runoff. ( )

3-Hottest regions are regions in which the evaporation process is the greatest. ( )

3 Give reasons for:

1- Changing of water from one state to another

……

4 Write the scientific term of each of the following:

1. It is the process in which matter changes from gas state to liquid state. (……………………)
2. It is the step in which water flows along the Earth's surface into the river and then into the ocean or sea (……………………)
3. It is the step in which rainwater falling on the Earth's surface is collected in different water bodies (……………………)

Lesson 2

How Do Solar Energy and Gravity Drive the processes of the Water Cycle?

Water cycle:

It is the continuous movement of water among different water reservoirs.

Water reservoirs:

They are **storage** locations of water on Earth.



Water reservoirs include:

- Oceans. - Seas. - Lakes.
- Rivers. - Glaciers. - Soil.
- Rocks. - Living organisms. - Atmosphere.



- The main processes and steps that move water depends on:

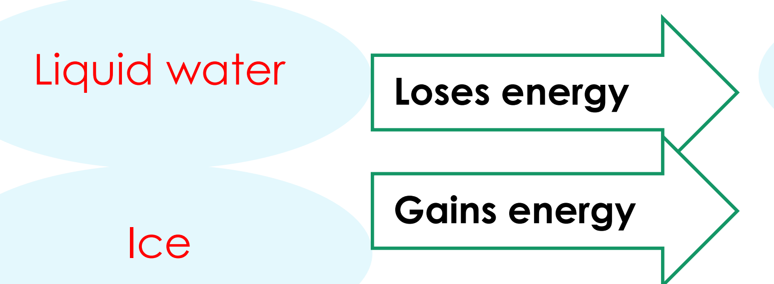
1- Energy

2- Force

1 Energy

The **Sun** is the most important source of energy that affects the water cycle.

Thermal energy of solar radiation that causes the change of the state of water through the water cycle, where:



Ice

Liquid water



2 Force

There is a main force that affects the water cycle, which is **gravity.**

Gravity

It is the force that causes:

❶ Falling of melting ice crystals and water droplets found in clouds back to the Earth's surface.



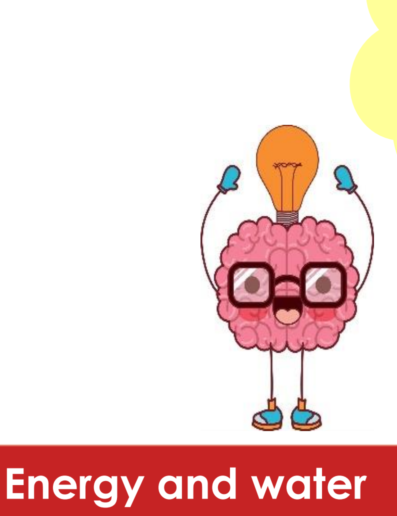
This leads to flowing of liquid water downhill into streams and rivers towards larger water bodies.

❷ flowing of water in solid state (ice) in glaciers from higher altitude areas to lower altitude areas

❸ Leakage of liquid water down into the ground then to groundwater reservoirs

---

Wind also affects the movement of water.



Energy and water

Gaining or losing energy affects the water particles (molecules) in the air.

The movement of air from one place to another in the presence of difference in temperature leads to:-

1. Evaporation (Changing of liquid water to water vapor)
2. Condensation (Changing of water vapor to liquid water)



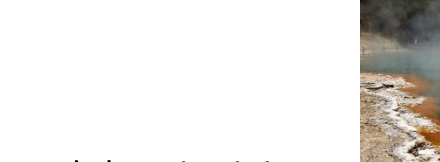
Transfer of energy:

when water particles **lose** thermal energy → Condensation and freezing processes ocure.

When water particles **gain** thermal energy → Melting, evaporation and transpiration (in plant leaves) are processes occur

Evaporation

- The Sun heats water in different water bodies



- This leads to evaporation of water and changing it into water vapor due to gaining thermal energy.





Transpiration

Transpiration:
It is a type of **evaporation** that takes place through the **stomata** on the **plant's** leaves.





10% of water vapor in the air comes from transpiration of plants.

Examples of transpiration:-

Formation of water droplet on the plant that covered with a plastic bag around the leaves





When the amount of the energy comes from the Sun increases, the transpiration in plants leaves increases.

Condensation

How does the condensation process occur?

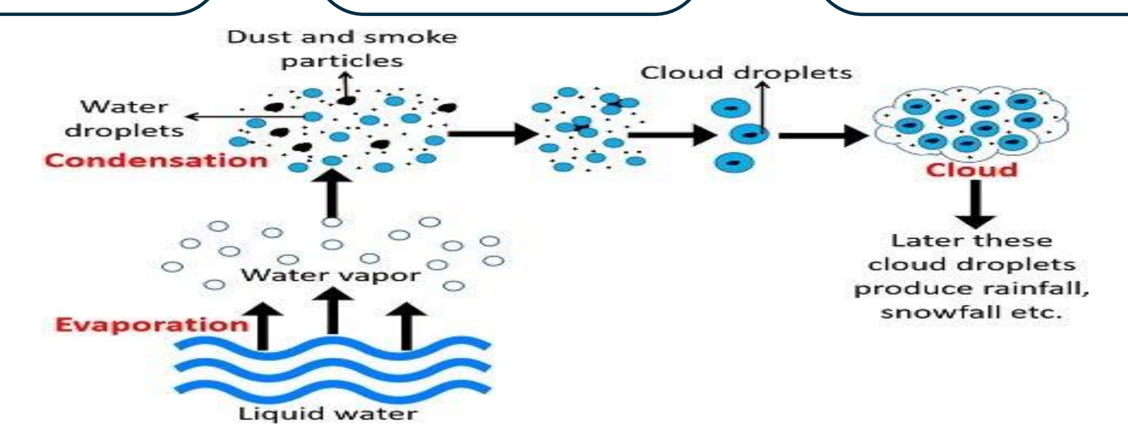


- When the air that is saturated with water vapor **cools** due to decreasing of air temperature, so the water vapor changes into liquid water.

- When clouds are formed.

How are clouds formed?

1. Water vapor in air is condensed into water droplets
2. Water droplet attach to particles of dust, smoke in the air
3. Large numbers of those water droplets join together, they form clouds



Clouds are made up of millions of tiny water droplets, when these water droplets become too heavy, they fall in the form of rain.

Classwork sheet

1 Complete the following sentences:

1. The movement of water through different water reservoirs on the Earth is called the…………………………..
2. The water starts to move or change its way of movement when a……………………..affects it.
3. The force which cause moving down of water from the top of a mountain is called……………………..
4. Transpiration is a form of……………….process, while condensation takes place by the decrease in the…………….energy.
5. Water vapor comes out from plant leaves through the…………
6. When……………….in air hits a cold glass of juice, it will condense.
7. Water vapor condenses in the sky to form…………………….
8. Drying up of a shallow pond in summer is an example of…………………..process
9. When the water droplets in the clouds become too heavy, it causes …………………………..process.

2 Write the scientific term of each of the following :

1. It is a form of evaporation that takes place through the stomata which are found in plant leaves. (……………………….)
2. It is the process which helps in formation of clouds in the sky (……………………….)

3 Give reasons for:

1. Changing of some amount of water in water bodies into water vapor.

……

2. About 10 % of water vapor in air comes from plants

……

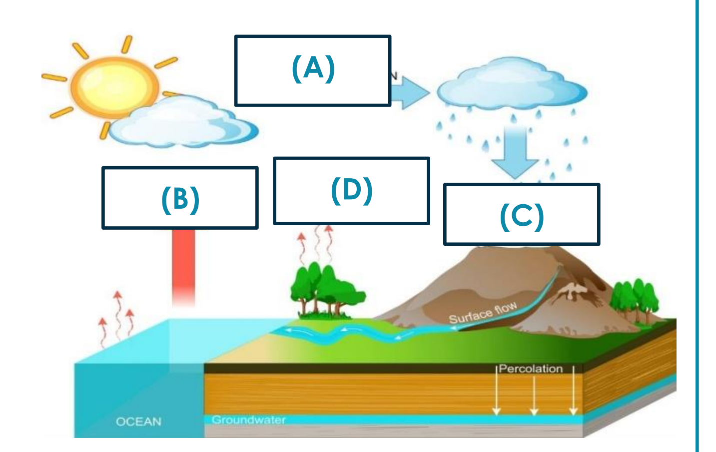
Study the following figure then answer:-

1. The process (A) is called ……………………………

2. The process (B) is called ……………………………

3. The process (C) is called ……………………………

4. The process (D) is called ……………………………



Homework sheet

1 Choose the correct answer:-

1. **Melting of snow at the two poles, is due to the thermal energy that comes from the …………………**
   a. wind. b. moon. c. Sun. d. electricity.
2. **Leakage of water into groundwater reservoirs is due to the action of…………………………**
   a. condensation b. gravity. c. precipitation d. evaporation.
3. **All the following are examples of water reservoirs on the Earth, except**
   a. seas. b. glaciers. c. moon. d. living organisms.
4. **Movement of air can change the state of water from…………….state to …………………state by evaporation process.**
   a.gas – liquid b. liquid – gas c. solid - gas d. solid - liquid
5. **Both of…………and…………….processes happen due to the decrease of thermal energy.**
   a. melting - freezing b. melting - condensation
   c. freezing – condensation d. melting - evaporation
6. **The Sun heats the water of seas and oceans and this leads to occurrence of…………………… process.**
   a. freezing b. melting c. evaporation d. condensation
7. **The form of evaporation process that takes place from the leaves of plants is called……………………**
   a. transpiration. b. collection. c. melting. d. freezing.
8. **About 10 % of the water vapor in air comes from transpiration of ……………**
   a. humans. b. rocks. c. animals. d. plants.
9. **Water vapor that is present in air changes into…………….when it hits a cold water bottle.**
   a. gas state b. liquid water c. steam d. juice
10. **Clouds are formed due to …………………………process.**
    a. melting b. collection c . Condensation d. freezing
11. **The form of water that is found in air and sometimes we cannot see it is the…………………**
    a. liquid water. b. water vapor. c. ice. d. snow.

2 Give reasons for:

1. Moving down of glaciers from the top of a mountain to its foot.
   ……………………………………………………………………………………………

3 Write the scientific term of each of the following :

1.They are the places of storing water on the Earth. (………………………)
2.The force which causes moving down of water from higher places to lower places on the Earth (………………………)

Lesson 3

Energy Transfer and the Water Cycle







- Humans, animals and plants need fresh water to survive.
- Most of plants depend on rain that falls from the clouds in the sky to grow.

The water cycle in nature:

- The water cycle provides water for all living organisms and regulates weather on our planet.
- Nature recycles water, where the water cycle includes the continuous movement of water from their different resources to the atmosphere, then this water finally back to Earth in the form of rain, sleet, snow or hail.

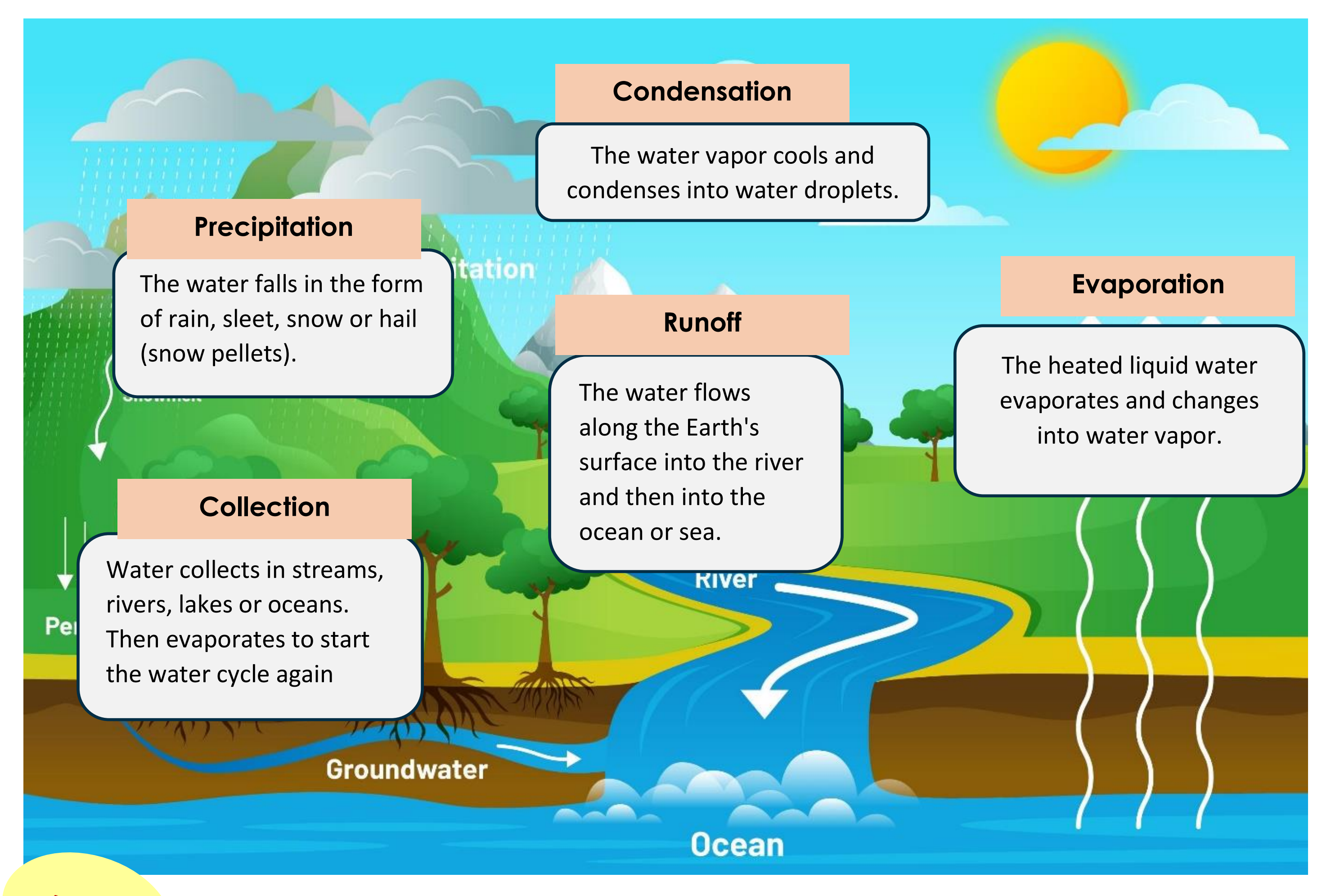
Give reason for...



The total amount of water on Earth does not change even if water changes from one state to another.

✓ Because it can be replaced (recycled) through the water cycle.

The main process of water cycle



Notes

Convection is one way by which heat can transfer.

Convection:

It is the process in which heat transfers in liquids and gases, where hot molecules(less density) rise **upward**, while colder molecules (more density) **fall down**.

✓ **Example :**

The heat of the Sun transfers from space to Earth's atmosphere by **radiation**. This heat can transfer through Earth's atmosphere also by convection in the form of convection currents.

The unequal heating of land and oceans causes **difference in temperatures and densities** in water of oceans and atmosphere.

Convection Current

When a liquid or gas is **heated**, it expands and becomes less dense, and lighter, so it rises upward.

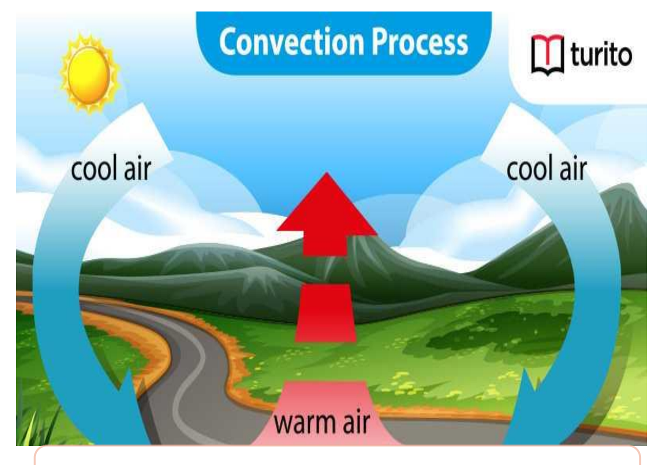
While the **cold** liquid or gas is more dense, so it moves downward and replaces the warm liquid or gas.

This movement form a cycle of convection currents

The force of gravity rotate the convection currents causing the formation of wind and ocean currents.

Convection currents in Earth's atmosphere help in determining the regional climate.





Convection Current

The relationship between convection and condensation:

- **Convection** causes the rising of temperature of air that contains water vapor.
- **Condensation** happens when this rising air loses its heat and the cold water vapor changes into water droplets and finally this leads to formation of clouds.

Water cycle Model



- Condensation and freezing are two processes occur when water particles lose thermal energy.
- Evaporation, melting and transpiration are processes occur when water particles gain thermal energy.
- Gravity is a force affects the movement of water in the water cycle.

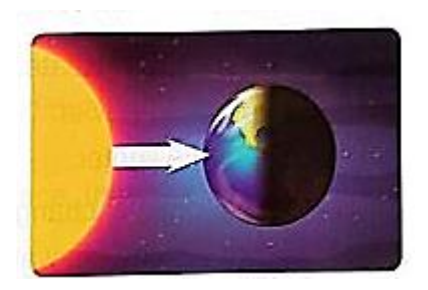
Heating the Earth

- The weather of the areas near the equator is hot and humid.
- The weather of the areas as we move away to north and south of the equator depends on the temperature
and precipitation at these areas, where :

- The weather could be warm and humid.
- Or, the weather could be freezing cold.

Some areas on Earth have very little rains and this causes the formation of large areas of deserts.

► How the inclination of sun rays affects the weather.







The sun rays fall **perpendicular** on Earth's surface near the equator, giving high effect of heat, so **the weather is hot**

The sun rays fall **Semi-inclined (semi-slanted**) on Earth's Surface, the sun rays are distributed on a large area, so the **Weather is warm.**

When the sun rays fall **very inclined (very slanted)** on Earth's surface in the area far away from the equator, **so the weather is very cold**.

Worksheet

1 Complete the following sentences

1. Heat can transfer through the Earth's atmosphere due to the effect of………………….currents

2. The difference in the…………..and…………….in water of oceans and atmosphere occurs due to the unequal heating of land and oceans.

3. Fresh water changes into water vapor when it……………..thermal energy, while fresh water changes into…………..when it loses thermal energy.

4. Rain water is collected in oceans by the effect of…………….. force.

5. The weather of the area far away from the equator is............ because the sun rays fall……………. on the Earth's surface at this area.

6. Cold water has more…………….than warm water, so it moves under the warm water.

7. The Sun produces the energy which causes the movement of…………….currents that produces ocean currents and ………….

8. Due to convection currents, hot air moves…………cold air.

2 Give reasons for:

1. Hot air moves upward above cold air.

………………………………………………………………………………

2. The weather in the area near the equator is hot.

………………………………………………………………………………

3 what happens to...?

1. The weather if the sun rays fall very inclined on an area.

……

2. The density of air if the cold air is warmed by the effect of solar energy.

……

Homework sheet

1 Choose the correct answer:

1. Gathering the water of rains to form streams, rivers or lakes, is called……………………..
a. precipitation. b. evaporation. c. collection. d. condensation.

2. Due to convection,……. air moves upward above……..air.
a. cold - hot b. hot - cold c. cold - warm d. warm - hot

3. The air which is found in the atmosphere heats up by the help of the……………………
a. moon. b. heater. c. gravity. d. Sun.

4. When a liquid is heated, it will .... and become less dense and……………………
a. expand - heavier. b. contract – lighter.
c. expand - lighter. d. contract - heavier.

5.Water in oceans changes into …………… when water gains thermal energy.
a. liquid water b. water vapor c. snow d. sleet

6. Fresh water stored underground in the form of groundwater by the effect of……………………
a. condensation. b. electricity. c. gravity. d. evaporation.

7. The weather of the areas near the equator is………………
a. hot and humid. b. hot and snowy.
c. warm and humid. d. warm and snowy.

8. Due to the very little rains which precipitate in some areas on Earth, large areas of ………………are formed.
a. forests b. seas c. oceans d. deserts

9. When the sun rays fall semi-inclined on Earth's surface, it is distributed on a large area giving…………….effect of heat and the weather becomes………………………….
a. high-warm. b. low -warm. c. high-cold. d. low-cold.

2 Give reasons for:

1. The effect of heat is low in the area at the north and south of the equator.
……

Lesson 4

Convection current and the water cycle

Convection is a type of heat transfer, where hot molecules (less density) rise **upward**, while colder molecules (more density) **fall down**.

Convection and gravity force affect the movement of water through the water cycle.

Earth's Wind

- ✓ Earth has a global wind system that consists of winds below in a constant direction over long periods of time.

Give reason

✓ **Wind is a main factor in determining weather and climate.**
Because it carries heat, moisture, rain, snow……etc.

✓ So the change in wind causes change in weather.

• Unequal heating of the Earth between the poles and equator generates wind.
• Wind helps in transporting water through water cycle by carrying water vapor or by forming of ocean currents.

What are the factors that determine the wind direction?

1. Amount of solar radiation that reach the Earth
2. Rotation of the Earth



What would happen if there is no wind on Earth?

• The regions around the equator become extremely hot and the poles will completely freeze.

• Some ecosystems will change completely.

• Some ecosystems may disappear complete

How does wind form?

Wind is generated when the warm air rises upward by the effect of sun's radiation and it is replaced by cooler air that flows from nearby areas, where.............

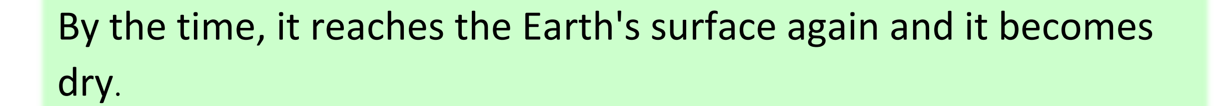
If the warm air contains enough amount of water vapor during its rising, the water vapor condenses and the rain fall.



At the same time, cooler air masses flow from nearby areas to replace the rising warm air.



When the warm air flows away from its place to another one, it cools and descends.

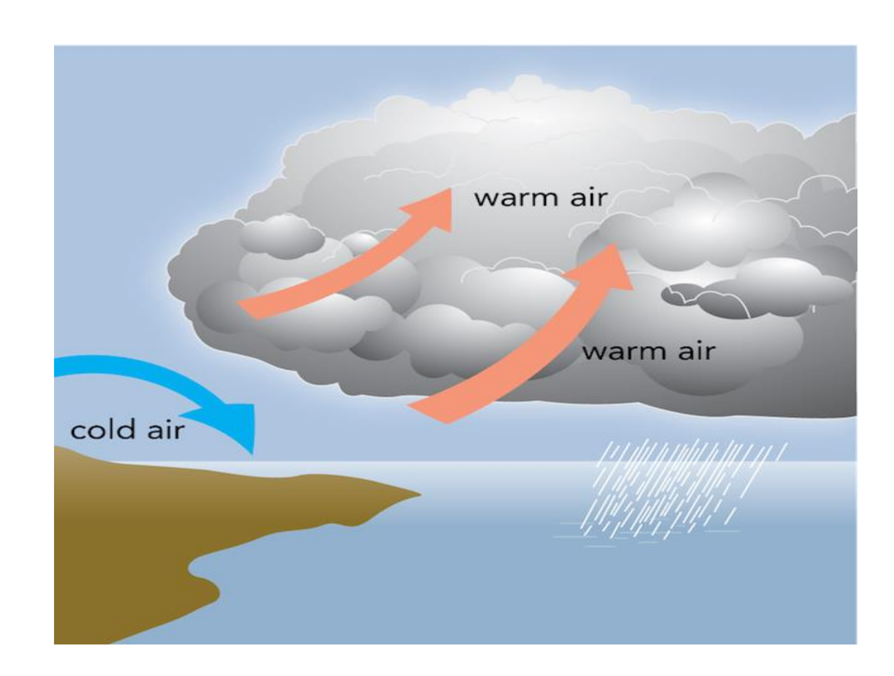


By the time, it reaches the Earth's surface again and it becomes dry.

This dry air forms a group of dry deserts around the Earth.



Then, the air flows back again to the same place.



Worksheet

1 Complete the following sentences using the words below:

(Rotation - deserts - direction - upward - solar radiation - winds - rain – downward)

1. The global wind system of the Earth consists of ....that blow in a constant over long periods of time.

2.The direction of wind is determined by the amount of...................... received by the Earth and............of the Earth.

3. When warm air contains enough water vapor, it loses this water in the form of ....

4. When warm air is cooled, it will move ...., while cold air moves...........when it warmed

5. Dry air causes the formation of large areas of......................around the Earth's surface.

2 Give reasons for:

1. On adding warm water to cold water without shaking, the warm water stay above cold water without mixing.
   ....

3 Write the scientific term:

1. Large areas of land which are formed due to the effect of dry air (..................................)
2. It is the main source which is responsible for warming of air and forming wind (.................................)

Homework sheet

1 Choose the correct answer:-

1. During washing your hands, water falls down from the water tap toward your hands by the effect of……………………..

a. condensation. b. freezing.
c. gravity. d. precipitation.

2. All the following are examples of convection currents effect, except…………………..

a. cold air moves above hot air.
b. very hot air moves above warm air.
c. hot water moves above cold water.
d. warm water moves above cold water.

3. Wind is produced by the help of……………………..

a. water turbine. b. electric generator.
c. solar radiation. d. electric motor.

4. Wind is formed when……………… rises and replaced by………………… that flows from nearby areas.

a. warm air - cold air b. warm water - cold water
c. cold water - warm water d. cold air - warm air

5.When warm air contains big amount of……………………., the warm air loses it in the form of rain.

a. ice b. liquid water c. sleet d. water vapor

6. When warm air is cooled, it will move…………………………….

a. upward. b. downward. c. forward. d. backward.

7. The……………… air causes the formation of many desert areas around the Earth's surface.

a. cold b. moisten c. dry d. dusty

8. Wind helps in transporting water through the water cycle by carrying……………………

a. sand grains. b. small rocks. c. plant leaves. d. water vapor.

2. The formation of wind is determined by the amount of solar radiation received

2 What happens to…?

1. The air temperature if there is no wind on Earth.

………………………………………………………………………………………………………

2. The movement of air when solar radiation heats up the air in an area.

………………………………………………………………………………………………………

Lesson 1

What are the causes that lead to this change in weather?

- The density of **cold** and dry air is **more** than that of **hot** and humid air.
- When a part of air is heated by the Sun, it becomes **hot and humid.**
- When the **hot** and humid air meets the **cold** and dry air, the hot air rises.
- As the hot air rises, it becomes colder and this coldness causes water vapor in hot air to condense, then the rain falls.





▶ **How does a meteorologist predict what the weather will be?**

Meteorologist

A scientist who studies the atmosphere to understand Earth's weather

They use some instruments to collect data and study changes of weather

Farming the Desert

- Deserts receive about **250 millimeters** of rain per year and this represents the least amount of rain compared to all other biomes.
- It has extreme hot and dry climate of desert that makes farming difficult.
- **Farmers face a challenge** in farming deserts because more water evaporates than that falls by precipitation.



Improving the soil of deserts:

1) They improve the **soil quality.**
2) They plant crops that are able to **grow in the hot climate** and low-fertility soil.
3) They use new ways to **irrigate crops**, such as reusing water.
4) They use **wind and the Sun** to power their farms in desert with wind turbines or solar energy.



Weather Changes

Mountain Effect and rain shadow phenomenon

Wet side (face the coast)

Dry side (Away from the coast)

condensing water vapour
rain shadow region
precipitation
dry, descending air
moist, rising air

- When warm air (faces) this side of a mountain range, so this air rises and cools.
- Water vapor in the cold air **condenses**, so the **precipitation** occurs.

The air descends (move down) and becomes warm, so this air dries the land of this side

Changes in the atmosphere:

The properties of the atmosphere at the top and bottom of the mountain:

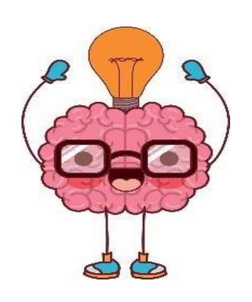
At top of mountain

The atmospheric pressure: low.
The air temperature: low.
The air density: low.



At bottom of mountain

The atmospheric pressure: high.
The air temperature: high.
The air density: high.



Air pressure air temperature and air density **decreases** as we go from the **bottom** of the mountain to its top.

Classwork sheet

1 Complete the following sentences:

1. The amount of rain that falls on deserts is… .... than that which falls in other biomes.
2. The amount of water that evaporates is............... than the amount of rain that falls on deserts.
3. The scientist who studies the Earth's atmosphere is called...............
4. The side of coastal mountain ranges in which air moves up when hitting a mountain is the side, while the other side is the… ....side.
5. Farmers in desert may use the .... energy produced from the Sun to power their farms
6. As you climb to the top of a mountain, the air density will............. while as you move down toward the bottom of it, the air temperature will..................
7. When the hot and humid air meet the cold and dry air, the.............air rises.

2 Write the scientific term of each of the following:

1. A scientist who studies the atmosphere to understand Earth's weather.
(..........................)

2. A side of mountain ranges at coastal regions that faces the coast
(...........................)

3 Give reasons for:

1. Desert farming faces many difficulties.
....
2. Sometimes people prefer to live in desert land instead of cities.
....

4 What happens to...?

1. The atmospheric pressure, as we move up toward the top of a mountain.
....
2. Air density, as we move down toward the bottom of a mountain.
....

Homework sheet

1 Choose the correct answer:-

1. Desert farming depends on the maximum use of... .... as its quantity is very small.

a. sand b. sunlight c. water d. winds

2. At the top of the mountain, the atmospheric pressure is...............and the temperature is .... compared to the bottom of the mountain.

a. lower - lower b. higher - higher

c. lower - higher d. higher - lower

3. The density of cold dry air is .... that of hot humid air.

a. more than b. equal to c. less than d. similar to

4. A rain shadow is an area that is formed behind a ....

a. tree. b. mountain. c. building. d. bridge.

5. The side of coastal mountain ranges in which air moves up when hitting a mountain is the... side, while the other side is the side.

a. wet-dry b. dry -wet

c. upper - lower d. lower - upper

6. If the temperature at the bottom of a mountain is 15°C, this means it may reach. °C at the top of this mountain.

a. 30 b. 25 c.20 d.2

7. The change of water from liquid state to gas state is known as .... process.

a. evaporation b. melting c. condensation d. freezing

8. Water vapor in the atmosphere can condense and form...........

a. air. b. clouds. c. sunlight. d. wind.

2 Write the scientific term of each of the following:

1. A side of mountain ranges at coastal regions in which the rain shadow phenomenon occurs. (.....................................)

3 Give reasons for:

1. Hot air moves up, while cold air moves down.

....

Lesson 2

Meteorology: The Science of Predicting Weather

Meteorology:

It is the science of studying and predicting the weather.

Meteorologist:

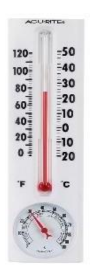
The scientist who uses a variety of tools and instruments to study and forecast weather.



• Some instruments are designed to measure and predict the weather conditions, such as:



Barometer that measures the atmospheric pressure



Thermometer that measures the temperature.

Atmospheric pressure:

It is the amount of force that air exerts on its surroundings
or
it is the weight of the air above a certain area.

Meteorologists use some tools like satellites, airplanes and weather balloons to carry measuring instruments high into the atmosphere to measure conditions of weather from different altitudes.`



Weather Balloon

What is the importance of satellites and weather station for meteorologist?

They transmit data from the satellite or station to meteorologists so; Meteorologists try to collect a lot of data about humidity and weather condition



Satellite

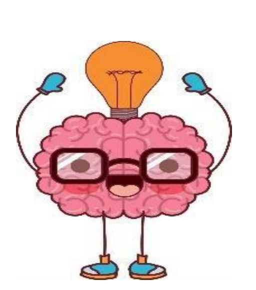
Humidity:

It is the measure of how much **water vapor** is present in the air.

Analyzing the data

- **Meteorologists** usually use **weather maps** to collect data from different places and analyze them to see the important weather conditions such as the movement of air.



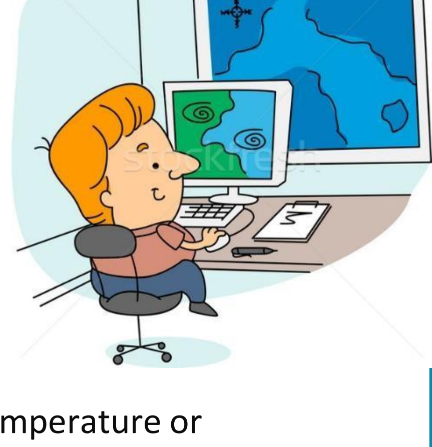


Mapping data

Means representing data on a map

How can the meteorology predict the weather?

1. Collecting and analyzing data
2. observing some other factors that affect the atmosphere such as landforms
3. Using complex computer models to predict how these different factors will interact

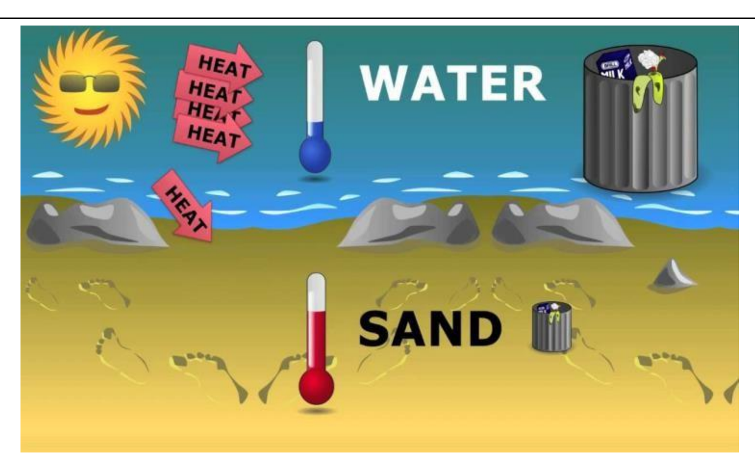




► Weather forecasts can be uncertain for next days or weeks, where

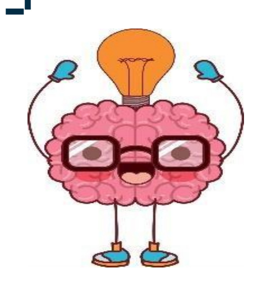


- Some small unexpected and quickly changes in wind, air temperature or moisture in air can affect next week's weather.



- **Sand is heated up faster than water.**
- **Sand is cooled off faster than water.**

The effect of thermal energy of the Sun on land (sand) differs from that on water, and this causes the change of air temperature above land or water areas on the Earth's surface.



Worksheet

1 Complete the following sentences:

1. At night, the sand on the seashore cools... ....than the sea water.
2. At noon, sand gets hot in a... .... time than water.
3. The temperatures of both water and sand ....in the presence of a source of heat
4. Sea water absorbs heat slowly and loses it...................
5. A thermometer is used to measure............ , while a barometer is used to measure.........

2 Give a reason for:

At noon, we may not be able to stand barefoot on the sand of a beach in summer, but we can swim in the sea water

....

3 Write the scientific term of each of the following:

1. The science that studies the weather conditions. (.........................)
2. A scientist who studies the Earth's atmosphere and forecasts the weather. (.........................)
3. A device used to measure atmospheric pressure. (.........................)

4 put (t) or (f)

1- Mapping data allows meteorologists to represent data about weather (.........)
2- Sand cools down in a shorter time than sea water during nighttime (.........)

Homework sheet

1 Choose the correct answer:

1. The barometer is used to measure....................................

a. air temperature. b. atmospheric pressure
c. mass. d. length.

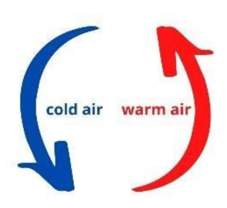
2. Instruments like thermometers and barometers can be carried into the atmosphere to measure weather conditions from different altitudes by using one of these tool, except

a. satellites. b. weather balloons,
c. airplanes. d. cars.

3. Heat transfers from the.............object to the .... object.

a. big-small b. small-big c. hot-cold d. cold –hot

When air is heated. → -it expands as its molecules spread out. → It becomes less dense and moves up.





When air is cooled → it contracts as its molecules come close to each other → so, the cool air becomes denser and moves down.

Give reason for.

Hot air moves up, while cool air moves down.

Because hot air is less dense than cool air



Notes:

- Warm air rise up.
- Cold air falls down and replaced by warm air.



Notes

1. The vertical movement of air (up and down movement) is called (air current)
2. The horizontal movement of air (left and right) is called “wind".
3. **The differences of air temperature of area that is close to each other on Earth affect:**

- The speed of air current.
- The speed of wind.

-The direction of wind movement

Tools for Forecasting

Anemometer

- Anemometer that measures the **wind speed.**



Weather radar

- Weather radar that detects the **intensity and speed of precipitation** and tracks thunderstorms and hurricanes.



Rain gauge

Rain gauge that measures the amount of **rain** in a certain area



How precipitation occurs?

When a small water droplet is formed in a cloud, the air can hold them up.



- But, as water vapor continues to condense, the droplets become bigger and heavier.



- Then gravity pulls these big and heavy water droplets toward

Snow is formed when the air in clouds is cold enough to change the water droplets into ice crystals that fall to the Earth's surface in the form of snow (which is known as "**snowfall")**

Classwork sheet

Complete the following sentences:

1. Hot air rises up as it has............density than cold air.

2. The density of hot soup is..................than that of cold soup.

3. Gases and liquids expand by .... and contract by cooling.

4. When air is heated, it expands as its molecules move each other.

5. When air is heated, the ....air will rise above the air.

6. The horizontal movement of air is called........ , whereas the vertical movement of air is called ....

put (t) or (x)

1. Hot air rises above colder air ( )
2. Transfer of heat by convection occurs in solids, liquids and gases ( )
3. When the air is cooled it rises up ( )

Write the scientific term:

1. Measure the atmospheric pressure (...........................)
2. Measure the wind speed (...........................)

Homework sheet

Choose the correct answer:-

The form of energy that flow from one object to another is called ....

a. sound b. thermal c. magnetic d. potential

2. Convection is a way of transferring of heat in liquids and gases due to difference in....................and .... the

a. mass - color. b. shape - volume

c. temperature - density. d. color - temperature.

3. Heat is transferred through the atmosphere by....................

a. convection, b. conduction. c. reflection. d. absorption.

4. When air is heated, its... .... changes.

a. mass b. smell c. color d. density

Write the scientific term:

1. Measure the wind speed (.......................)
2. Measure the temperature (.......................)
3. Measure the amount of rains (... ....)

Lesson 4

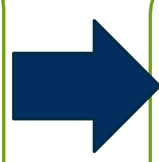
Extreme Weather: Floods and Sandstorms

Extreme weather phenomena such as drought, floods and sandstorm increase due to global climate change

Example:-



Drought



It is the shortage of water that is available for drinking, growing crops, farming animals and industry

Because:-

The extreme hot temperatures for long period



Flood



Increase in the flow of water over the edges of riverbank and onto the land around the river

Because:-

1. The increase in the rate of the rainfall every 2 years
2. The sudden melting of snow and ice over a region.

*Every few decades very extreme floods occurs causing damages or loss of life

*Flood is more danger if the land around it is frozen and cannot absorb water

Harms of floods

- Damaging of buildings by moving or breaking them.
- Death of people and animals.
- Harming of economy.

Advantage of floods:

Some ecosystems depend on periodic floods such as ecosystems along the Nile.



It occurs when very strong winds blow up sand or dust from a dry area such as deserts.

Sand Storm or "dust storm"

They extend for several kilometers long and its height may reach hundreds of meters.

► Harms of sandstorms:



They stop generating energy from solar panel.



They harm the respiratory system and eyes



Reduces the visibility during driving cars

- Dust fills up irrigation canals, so the water quality decreases.
- Dust damages the plane engines.

Classwork sheet

Complete the correct answer:

(flooding- drought- decrease- increase- dry- wet)

1. Extreme hot temperature may cause...........................
2. Heavy rain may cause**..................................**
3. Sandstorms..................................the chances of car accidents
4. Dust storms .... the water quality in irrigation canals
5. Floods result in formation of.................... lands
6. Strong winds may blow up sand from a.................... area such as deserts

Give reason for

1. **Floods have some benefits**

   ..
2. **Sandstorms have harmful effects on human health**

   ..

Write the scientific term:

1. A phenomenon in which very strong winds blow up dust that reduces the visibility during driving cars (...............................)
2. It is a natural phenomenon that occurs when the level of water in a river increases until it overflows its banks (...............................)

Homework sheet

Choose:

1-**Extreme weather conditions include all the following except**

a- Drought b- flooding c- sandstorms d- sunrise

2- **Floods may occur as a result of ....and ....**

a- Gentle rain- melting of snow c- heavy rain – melting of snow

b -Gentle rain – freezing of water d- heavy rain – evaporation of water

3- **Drought affects all the following, except ....**

a-people b-plants c-buildings d-animals

4- **The increase in the amount of rain may cause ....**

a- Flooding b- drought c- sandstorms d- dust storm

-Write the scientific term:

1- **A phenomenon in which the condensed water vapor falls on the earth's surface in the form of rain , snow, sleet and hail** (................................)

Put (√) and (×)

1- Heavy rain may cause drought ( )

Lesson 1

What are the factor affect the growth of living organisms?

Environmental Factors (Acquired behaviors)	Genetics Factors (inherited behaviors)

- When there is a shortage in the environmental resources, living organisms must adapt to these changes to survive.

Dorcas Gazelle (Live in Egypt & Middle East)

Its body color helps it to adapt its environment.



It does not drink water for several months.

Small Dorcas gazelle is similar to its parents?

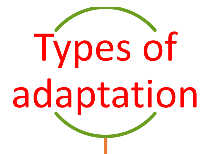
Because the small Dorcas gets genetic factors from its parent that allow it to survive

Adaptation

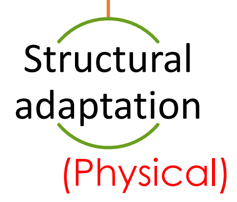
It is the process that helps living organisms **to survive in the** environment in which they live

Ex: **Camel and Cactus** plant is adapted in desert





Types of adaptation

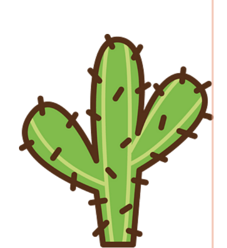


Structural adaptation (Physical)

It is the adaptation that is related to the body **structure** of a living organism to help it survive.

Examples

- **Thorns** on the stem of some plants.
- The thick fur of some animals that live in cold climate.





Behavioral adaptation

It is a change in the **behaviors** or acts of a living organism to help it survive.

Examples

- Bird migration
- The growth of some plants toward light.



Bird Migration

A group of animals moves together from one place to another and then return back again.



Reasons of Migration

To help in reproduction (breeding) by finding:

1. Different food resources
2. Suitable habitat



Environmental and genetic influences (effects) on migratory birds

- ✓ Extreme weather conditions.
- ✓ Predators.
- ✓ Shortage of food and water.
- ✓ Limited resting sites due to habitat loss.

Examples of **Migratory birds in Egypt**



- The Red Sea and Nile River are from important **stopovers** for millions of migratory birds every year.
- The main factors that attract the flocks of migratory birds to Egypt:

1. The moderate winter climate.
2. It contains different environment such as:
    - Coastal environment.
    - Marine environment
    - Mountain environment

Environmental and Genetic factors influences

Basic needs:

Living organisms need some basic needs to survive such as:

-Food. **- Water.** **- Habitat**

-sunlight **-Air**

Influencing growth:

The environmental factors and genetic factors affect the **behaviors**, **structure** and the **growth** of living organisms

---

1

Enviromental Factors

1. A viability of water
2. Availability of light
3. Size of habitat

affect the growth of plant as they affect photosynthesis process .



affect the growth of trees and shrups



affect the amount of plant that animals feed on .



Affect the growth and number of species of living organisms .



2 Genetic factors

The body size of animals

Size of Kitten changes gradually until it becomes as its parents.



The lenght of the plant

Plants like herbs usually shorter than the long flowering plants in a **forest**.



The fur color of animals

Affects the shape of a young rabbit when it has black spots on its fur like its parents



Worksheet

1 Complete the following:-

1. Both of environmental factors and…..............factors affects the growth of living organisms.
2. Thick fur is an example of structural adaptation for animals that live in…..............climate
3. Both of the…......... Sea and the…..............River are two important stopovers in Egypt for migratory birds.
4. Bird migration helps them to search for different…..........sources and suitable …..............to live in.
5. Egypt is an important stopover for migratory birds as it has …..............winter climate.
6 .Availability of water and light affect the amount of…............that represents the food of some animals.
7. The body size of animals and the length of plants are two…............factors that affect their growth.
8.Food, water and…................are the basic needs for living organisms to live and survive.

❷ Give reasons for:

1. Small Dorcas gazelle is similar to its parents.

………………………………………………………………………………

2. Falcons and eagles migrate to Egypt in winter.

………………………………………………………………………………

❸ what happens if…?

The environmental conditions changes in the homeland in which some migratory birds live.

………………………………………………………………………………

Homework sheet

❹ choose:

1. Dorcas gazelle lives in………………………..

a. tropical area. b. desert area. c. north pole. d. south pole.

2. The adaptation that is related to the body structure of a living organism, is known as……………………

a. structural adaptation. b. behavioral adaptation,
c. homeland. d. stopover.

3. Birds migrate to search for all of the following, except………..

a. best conditions for reproduction b. different food resources
c. another suitable habitat. d. another unsuitable climate.

4. **During their journey, migratory birds may suffer from all of the following conditions, except**

a. many resting sites are available b. presence of predators.
c. shortage of food. d. shortage of water.

5.Photosynthesis process is affected by some environmental factors such………………

a. availability of water only. b. availability of light only.
c. availability of water and light d. the length of the plants.

6.**Migration of animals to search for food, is considered as…**

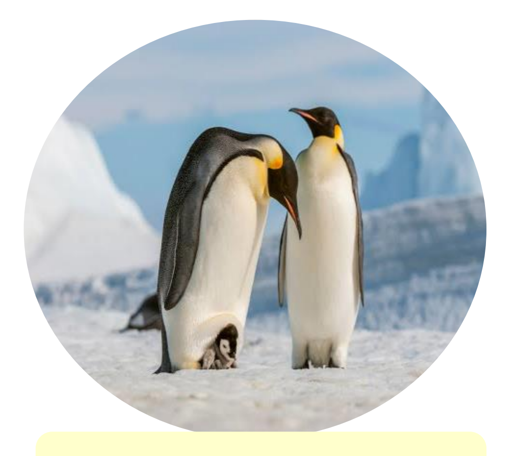
a. a type of structural adaptation only.
b. a type of behavioral adaptation only.
c. structural and behavioral adaptations.
d. a way to find more predators.

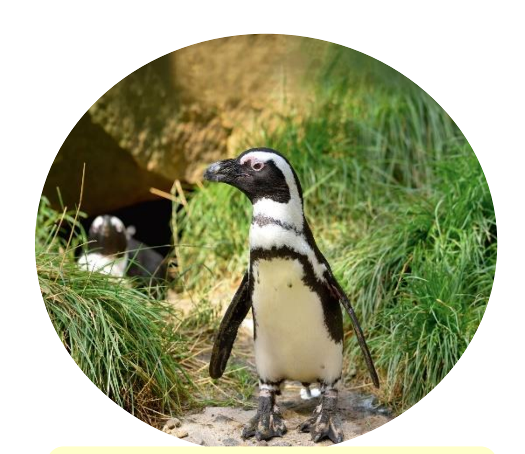

Lesson 2

Characteristic of the Environment and Ways of Adaptation of Living Organisms

Each environment has:-

- Its specific climate.
- Different types of animals and plants with traits that help them to survive in their environment as :-





	Emperor penguin	African penguin
Location	**The Antarctic**	**Along the coast of South Africa**
Adaptation	It has thick **blubber** (fatty layer) and its skin is covered with dense feathers to keep its body warm	Around each of its eyes, it has a circle of skin that doesn't have any feathers completely to help its body cool fast in hot weather.

Adaptation in some animals







Environment	Arctic	Tropical rain forest environment	Desert environment
Structural Adaptation	It has thick white fur.	It has colorful poisonous skin	Its body is covered with sandy-colored scales.
Reason	To warm itself.	To hide from its enemies and protect itself from predators.	To hide among the rocks in desert.

Adaptation in some Plants



Location: Egypt's Western Desert.
Examples: Acacia trees, palms, opuntia, spiny shrubs and grasses.
Adaptations:
Size: Most of them are usually **small** and herbal.
Roots: They have short **extended roots**

✓ To draw (absorb) any available water.

Leaves: Some of them have **thick** leaves to store water.
Stem: - Some of them have **thick** stems to store water.

- Some of them have **thorns** on their stems and branches

✓ **To keep away herbivores (animals that eat plants)**

Notes





When the rain falls in deserts, some plants reach the flowering stage **quickly** and produce seeds that can live for a long time to adapt the shortage of rainfall.

Abiotic Factors and adaptation

Ecosystem may be

Small

Ex Small area of **grass** around a round building that contains grass, insects and weeds



Large

The **arctic** where,
-Caribou feeds on grasses.
-Wolves hunt caribou and other animals.



Any ecosystem contains

Biotic factors

They are **living** organisms, such as animals and plants

Abiotic factors

They are **nonliving** things in an ecosystem such as:
Sunlight - Air - Water - Soil - Temperature

Ecosystem

It is an area that contains biotic factors (living organisms) and abiotic factors (nonliving things) that interact with each other

The effect of abiotic factors on the growth and adaptation of living organism

Effect of light on growth

Plants respond to the amount of **light** and **dark and which affect their growth.**

Some flowering plants may (produce) bear fruits when the **days** are longer than the **nights** in some environments.

Effect of light and water on adaptation

If living organisms can get water and light, they can survive.

But, if water and light are not available, **living organisms can't survive and will die.**





What happens if the light is too intense?

✓ It may damage the plant's parts and cause their drying or burning.

Notes



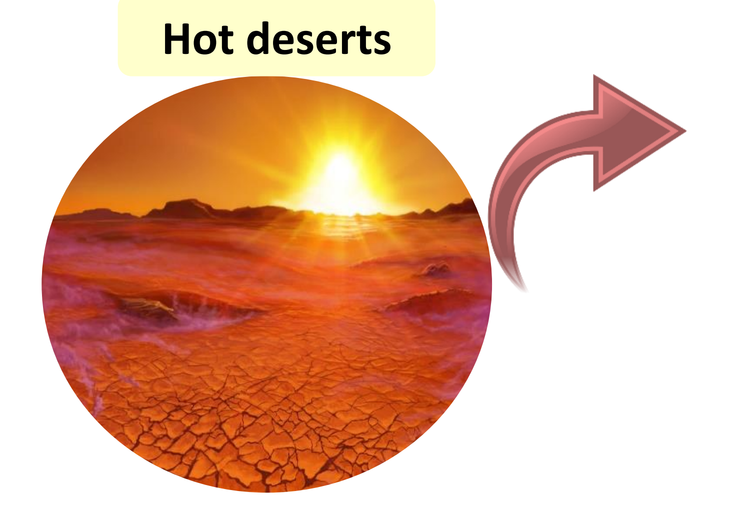
Living organisms have **structural** characteristics (physical traits) to adapt to abiotic factors in different environments.
Over time these structural characteristics transfer from parents to offspring.
So, they will have the trait that helps them to survive in extreme environmental conditions

Limited resources in the desert:

- Deserts are the most extreme environments on the Earth.
- Deserts may be **hot** area or **cold** area.
- All types of deserts have **little rainfall**.

Hot deserts VS cold desert

Hot deserts



- They have little amount of groundwater.
- Small pools of water are formed inside rocks during rains.
- Their plants have long roots to get the deep groundwater.
- Other plants have short extended roots near the Earth's surface to catch the **smallest drop of dew.**

Cold deserts



- Antarctica is a desert biome that its temperatures are cold all the year, where:
  - Its temperatures in winter go below freezing (below 0°C).
  - Its temperatures in the short summer reach a maximum of 21°C.

Light is an environmental factor

The plant's growth is affected by:

1. The intensity (quantity) of light can affect the plant's growth.
2. The duration of light that plant exposed.



Notes: - Chrysanthemum plant.

Can grow and produce flowers when the days are shorter than the nights.

While .....

Some flowering plants may bear fruits when the days are longer than the nights in some environments.

Worksheet

1 Write the scientific term:-

1. It contains biotic factors and abiotic factors that interact with each other. (......................)
2. The factors that include living organisms in an ecosystem. (......................)
3. The factors that include nonliving things in an ecosystem. (......................)
4. It is a desert biome that has a cold climate all the year. (......................)

2 Complete the following sentences:

1. Emperor penguin lives in .... and it has a thick.........and its skin covered with dense..............to keep its body warm.
2. African penguin has a circle of skin that doesn't have any ....around each of its eyes.
3. Some plants like palms and acacia trees live in the............environment in Egypt.
4. Some desert plants can store water in their.............and ....
5. Some desert plants have thick leaves to store.........................
6. Some desert plants have...............on their stems and ....branches to protect from then herbivores.
7. Any ecosystem contains................factors and............factors.

Home worksheet

3 Choose the correct answer:

1. Each environment on planet Earth has specific……….

a. climate only. b. plants only.

c. animals only. d. climate, plants and animals.

2. The trait that helps emperor penguin to keep its body warm, is the……………………

a. presence of thin fatty layer.

b. presence of thick fatty layer.

c. absence of feathers around its eyes.

d. absence of feathers around its body.

3. Emperor penguin lives in……………..while African penguin lives in

a. coast of South Africa - arctic region.

b. coast of South Africa - Antarctic region.

c. Antarctic region - coast of South Africa.

d. Antarctic region - arctic region.

4. Poison dart frog lives in……………environment.

a. arctic b. Antarctic

c. desert d. tropical rain forest

5. Arctic fox has to…………… warm its body.

a. colorful poisonous skin b. sandy-colored scales

c. thin white fur d. thick white fur

6. Acacia tree and arctic fox live in…………………

a. desert environment. b. arctic environment.

c. rain forest environment. d. Two different environments.

7. An area between buildings that contains grasses, insects and weeds represents …………………..

a. a large ecosystem. b. a small ecosystem.

c. structural characteristics. d. physical characteristics.

8.In the arctic ecosystem,………………………………..

a. grasses feed on wolves. b. grasses feed on caribou.

c. caribou feeds on wolves. d. wolves feed on caribou.

9.All the following are biotic factors, <u>except</u>……………………

a. animals. b. insects. c. precipitation d. grasses.

4 Give reasons for:

1. Poison dart frog has colorful poisonous skin.

   ……………………………………………………………………………………………………..

2. Lizard body is covered with sandy-colored scales.

   ………………………………………………………………………………………………

Lesson 

Inheritance of traits in living organisms

- All living organisms inherit traits which transfer from parents to their offspring (babies).

► Examples of inherit traits:

- In humans such as eye color, nose shape... etc.
- In animals such as fur color, fur length .... etc.
- In plants such as plant's length, shape of leaves ... etc.

- So, these inherited traits affect the structure of living organisms and their life.

- Genetic factors control what traits get passed down or inherited from parents to offspring

In animals: cats have different shapes but they belong to same species
(Felis catus)

Birman cat	Sphynx cat
Its kitten inherits the long, silky hair from its parents	It doesn't have any hair or may have only very fine hair. A sphynx kitten inherits its hairless body from its parents.

Give reason for...

Although Birman and Sphynx are cats, there is no sphynx cat has long hair like Birman cat.

✓ Because sphynx cat doesn't have the genetic factor for long hair which is found in Birman

Plant in the desert Adapted to survive in extreme conditions of desert such as the **very hot weather and very little rainfall**



So, each generation of plants becomes stronger and able to adapt

- ✓ Due to inherited traits which transfer from parent plants to their offspring.

Factors that Influence Human Growth and Behavior Development

- Lifestyle choices
- Genetic factors.
- Enviromental factor

1 Lifestyle choices

Bad habits like smoking and eating a diet full of chips harm your health and your growth. ☹
Good habits like eating a healthy food develop your health and behaviors. ☺



Genes:- They are tiny structures which found in the nucleus of cells of living organisms.

2 Genetic factors

- Genetic factors control the transfer of **inherits traits from parents to offspring.**
- Genes carry inherited traits from parents to offspring, so genes are responsible for determining the body features such as:
  - The way your earlobes hang.
  - The length of your fingers

3 Environmental factors

Your health and growth will be negatively affected, if there are some problems in your **environment, such as:**

- ✓ Health care is not available.
- ✓ Water may be far away or unsafe to drink.
- ✓ Difficulty to obtain food.

Worksheet

❶ Write the scientific term of each of the following:

1. It is the factor that controls which trait gets inherited from parents to their offspring. (……………………)
2. A type of cats that have long, silky hair with different colors. (……………………)
3. A type of cats that doesn't have the genetic factor of long hair. (……………………)
4. They are external factors that affect our health and we might not able to control them. (……………………)
5. They are responsible for determining the body feature, and present in the cell nucleus (……………………)

---

❷ Complete the following sentences:

1. All living organisms inherited ………….factors which transferred from parents to their offspring.
2. The type of cats that inherits its hairless body from its parents is known as ……………………..cats.
3. Sphynx cat doesn't have the genetic factor for…………..which is found in ……………cat

---

Give reasons for:

1. A birman kitten has a long and silky hair.
   ……………………………………………………………………………………………………
2. Your lifestyle choices affect your health.
   ……………………………………………………………………………………………………

Homework sheet

Choose the correct answer :-

1. Transferring of some properties from parents to offspring occurs in ………………………

a) living organisms only.
b) nonliving things only.
c) living organisms and nonliving things.
d) soil, air, water and sunlight.

2. The genetic factors transfer from…………………..

a) living organism to nonliving thing
b) nonliving thing to living organism
c) Parents to their offspring.
d) offspring to their parents.

3. Transferring of genetic factors happens in…………………..

a. humans only. b. animals only.
c. humans and animals.d. humans, animals and plants.

4.All the following are inherited traits in humans, except……………

a. eye color. b. nose shape c. fur color. d. ear shape.

5. Appearance of inherited traits on offspring, is due to passing down ……………from their parents.

a. environmental factors b. behaviors
c. genetic factors d. leaves

6. Birman cats have………………………………

a. very fine hair. b. long and silky hair.
c. no hair. d. black feathers.

7. Sphynx cats and Birman cats are different in the……………..

a. number of eyes. b. number of ears,
c. number of legs. d. length of hair.

8. All the following are inherited traits in plants, except……………

a. leaves color b. leaves shape c. length of stem. d. length of ears.

9. Bad habits in human's lifestyle include……………………

a. eating healthy food. b. doing exercises.
c. drinking more soda. d. avoid smoking.

10. Genes are tiny structures that found in………………………………

a. the cell nucleus. b. the cell membrane
c. the cell wall. d. mitochondria.

Give reason for:

1. Sphynx cat doesn't have long hair.

……

Concept 4.2

Lesson 

Soil and environmental changes



Soil

It is the loose layer (delicate skin) which covers the Earth's crust.

The environment varies according to the type of soil in it **G.R**



Because the soil has determine the type of plants that can grow in it, and animals which live in this environment

---

Environmental also affects the soil (as temperature increase soil will be dry)

- ✓ The soil is a basic factor for all natural ecosystems on Earth.

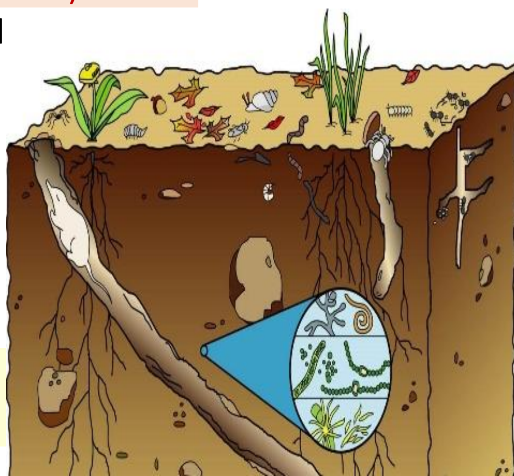
The soil is formed of some ingredients (components) such as:

❶**Sand**, **gravel** and **minerals** which are formed rocks through the weathering process

❷-Organic materials such as dead plants

❸-Living organisms

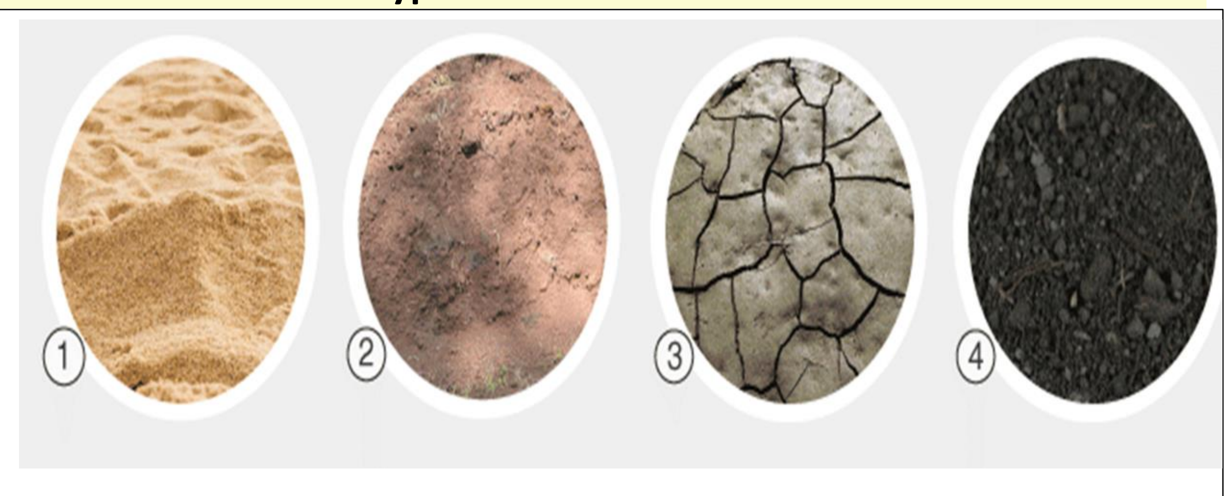
❹-Water



Note

Some living organisms make their shelters (homes) in soil such as : **worms and insects**.

There are 3 different types of soil



Differences	Similarities
They have different colors and textures.	• All types of soil are composed of natural components.
The size of soil particles may be **large**, **medium** or small.	• All types of soil keep the life on Earth.

•**Weathering** and **erosion** processes also have an important role in the formation of soil

The importance of soil:

1. Soil is important for the plants and animals **to survive**.

2. Soil provides the plant with its basic needs for growth as soil contains air, water and nutrients.

3. Soil is home to many different living organisms **such as:**

- ✓ Worms
- ✓ Insects
- ✓ Fungi

Composition of soil:-



When you examine a sample of soil by using a hand lens, you will notice the presence of small pieces of rocks, small pieces or leaves and branches (twigs) or trees and other dark colored materials.

•Also, there are other components of soil that can't be seen with naked eyes Bacteria.

soil are composed of





❶ Inorganic ingredients:

They are the nonliving components of soil.

- Inorganic ingredients include:

- Air. - Water. - Rocks and minerals.

Minerals:

They are the building units (blocks) of rocks.

How Inorganic materials in soil is formed:

During weathering
the rocks are broken down into small pieces of sand, silt and clay

During erosion process:
The small pieces of rocks move from one place to another.

During deposition process :
These small pieces of rocks will deposite and mix with other ingredients

❷ Organic ingredients:

They are living components of soil & Remains of dead plants and animals.

Note

Decomposers organisms such as: **fungi**, **bacteria** and **earthworms** play an important role in the formation of soil.

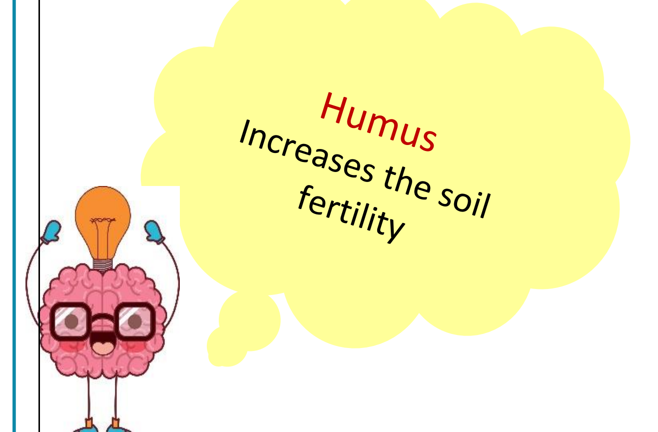
► How organic materials of soil formed:

Decomposers play an important role in keeping the balance of the ecosystem?

Because

❶ They decompose and recycle the remains of dead plants and animals in chemical **nutrients** such as carbon, nitrogen and oxygen which are released into soil, water and air.

❷ Decomposers break down the organic material of dead organisms into components rich with nutrients which called "**humus**" (increase fertility)





1. Minerals and organic materials represent about **half** of the most types of soil.
2. The other half of soil consists of spaces between the particles of the soil known as “**pore spaces (pores)**"where each pore space is filled with water and air.

Different soils, different ingredients:

►**The difference of the amounts of organic ingredients in the soil leads to:**

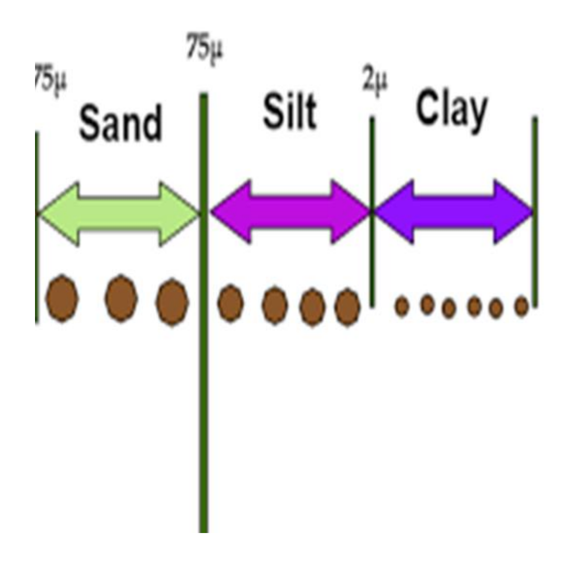
1. Changing the **appearance** of the soil and amount of nutrients in it.
2. changing the amount of nutrients

►**The difference in the size of particles and amount of different inorganic ingredients leads to:**

- Changing the appearance and **texture** of the soil.
- Changing the ability of soil to retain (keep) water.
- Changing the ability of soil to allow roots to grow.

►The following table shows the size of particles (granules) of inorganic components that affects the classification of different types of soil:

Inorganic component	Sand	Silt	Clay
Size of particles (granules):	Large particles	Medium particles	Small particles





Worksheet

1 Complete the following sentences:

1. Soil is composed of many inorganic ingredients as……………………,………………….and minerals

2. Soil is the shelter for many living organisms, such as……………..Worms and bacteria.

3. The spaces among the particles of the soil are called……………………and they are filled with................... ……..and………………….. ……………

4. The building units of rocks are called…………………….

5. The processes which play an important role in the soil formation are erosion ……………….and……………………….

6. The remains of dead plants and animals are decomposed into chemical nutrients such as……………, nitrogen and……………………

7. Organic material in the soil includes the remains of……………..and………..

8. Sand,……………….and……………….particles are products of rocks weathering.

9. According to the size of particles in the soil. …………… are the biggest particles, while…………………are the smallest particles.

2 Give reasons for:

1. Decomposers have an important role in the formation of soil.

………………………………………………………………………………………………………

2. There are many types of soil.

………………………………………………………………………………………………………

3. Soil is very important for plants.

………………………………………………………………………………………………………

Homework sheet

Choose the correct answer

1. From the main factors that cause the soil formation are ....and...

a. erosion - evaporation. b. weathering – condensation.

c. erosion – weathering . d. melting - gravity.

2. The soil provides the plant with all of the following, except.........

a. water. b. air. c. nutrients. d. sunlight.

3. Soil is important for plants as ....

a. it provides them with nutrients and minerals.

b. it presents the home of some animals.

c. some animals depend on plants in feeding.

d. it contains many small granules of rocks.

4 .... is the loose layer which covers the Earth's crust.

a. Humus b. Water c. Soil d. Air

5. The material rich in nutrients and produced from the decomposition of dead organisms is called.............

a. decomposers. b. humus. c. sand. d. water.

6. The organic materials which are found in the soil include ...and....

a. sand - remains of dead organisms.

b. humus - silt.

c. silt - clay.

d. remains of dead animals - plants.

7. Silt particles are larger than ....and smaller than.................

a. clay particles - sand particles . b. sand particles - clay particles,

c. big rocks - clay particles. d . sand particles - big rocks.

8. From the components that are not found in the soil.........

a. living organisms b. minerals. c. water and air. d. sunlight.

9. Which of the following are from the inorganic ingredients in the soil ?

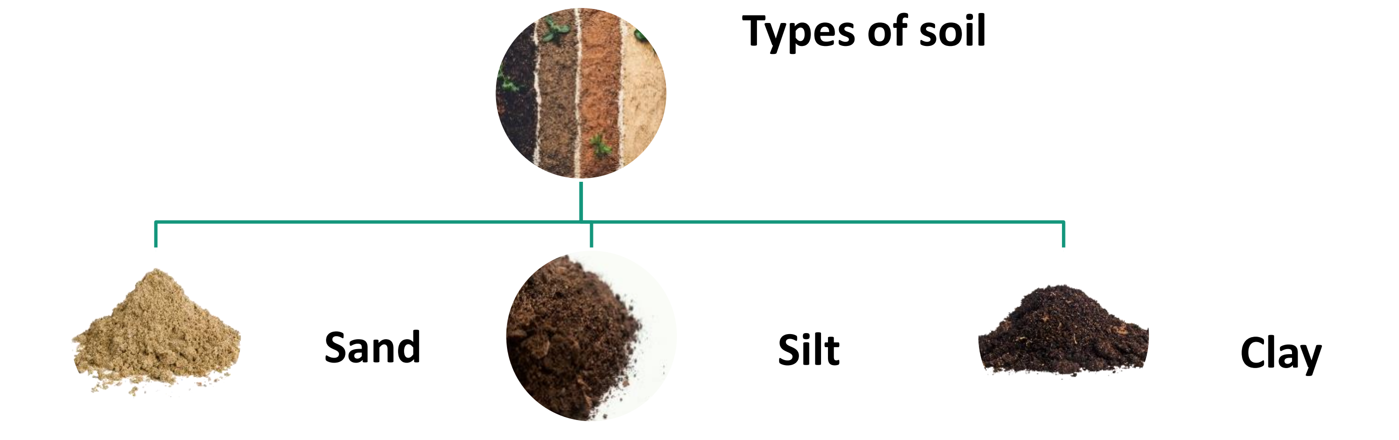
a. Rocks, air and water.

b. Plants, animals and air.

c. Decomposers, plants and humus.

d. decomposers, air and water

Different Types of soil



► We can summarize the differences between the three types of soil in the following table:

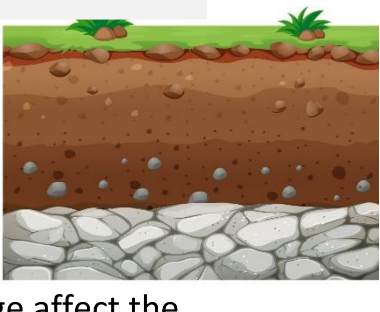
Points of comparison	Sand soil	Silt soil	Clay soil
1. The size of particles :	Large	Medium	Small
2. Color:	Yellow	Gray	Dark (black)
3. Flowing of water through it:	Fast	Medium	Slow
4. Retaining water:	Small	Medium	Large

Note

The soil that **retains** medium amount of water becomes more fertile because it keeps its organic materials and this helps in the plant growth

Ecosystem and soil

Soil affects the climate:-



- Soil is formed of many layers.
- The types of plants that grow in a certain soil have a large affect the temperature and the weather of the ecosystem.

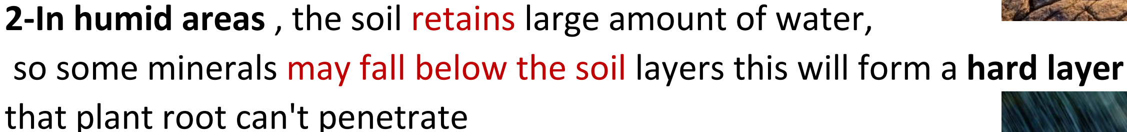


The climate affects the soil



1-In hot and dry areas, the soil which rich with clay particles, the clay becomes dry due to drought conditions that will form a layer that doesn't allow much water to flow.

2-In humid areas , the soil retains large amount of water,
so some minerals may fall below the soil layers this will form a **hard layer** that plant root can't penetrate



In some humid areas, when there is to much water, the soils in these areas become **waterlogged soils** that contain very large amount of water and very little amount of air and this **doesn't help roots** of plants to grow and also some living organisms in these soils to live.



Soil and ecosystem

1- Dry soils:

Large tree can't grow in sand soil, like Savannah

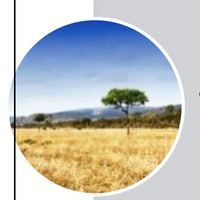
Because the sand soil is dry and loose that drains water



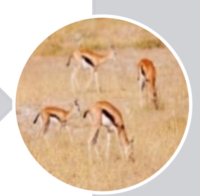
Savannas are common in central Africa.

-living organisms live in savannas depend on each other feeding.

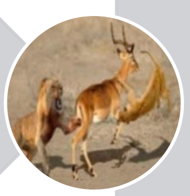
Example



Savannah contains a variety of grasses and small plants



herbivores as gazelles depend on grasses



Large and fast carnivores such as lions depend on herbivores

2-Soil in a Bog:



Bog ecosystem

- Clay soils which rich with clay particles retain much water very well, so the soil may be wet most of time.
- Most of plants that grow in this wet soil are basic for **bog** ecosystem.
- The moist conditions in bogs, lead to very cool temperatures.
- The most common animals live in bog ecosystem .
  - **Frogs**
  - **Mosquitoes**



Worksheet

1 Complete the following sentences:

1. Types of plants in the soil affect the……………………and ………….of ecosystem
2. During rainfall, the soil of humid areas retains………………..
3. When water level increases in some humid areas it becomes ……….soil that contains a little amount of………………
4. Sandy soil is……………and loose soil, so large tree can't grow in it.
5. Savannas are ecosystems that contain……………..sand soil.
6. Herbivores like gazelles can live in……………..ecosystem which has grass and small plants.
7. The moist conditions in bogs lead to very …………………that are suitable for some plants to grow in them.
8. Mosquitos and ……………are the most common in ……….ecosystems

Give reasons for:

1. Water can flow very fast through sand soil
……
2. The soil in a bog ecosystem is wet most of time.
……
3. Large trees can't grow in savanna grassland ecosystems.
……

Write the scientific term of each of the following:

1. The soil that has large-sized particles and its color is yellow. (……………)
2. The dark (black) soil that can retain large amount of water. (……………)
3. A type of soil that retains medium amount of water and has medium pore spaces between its particles. (……………)
4. The distances between the particles of the soil. (……………)
5. Grassland ecosystems that contain dry sand soil and are common in central Africa. (……………)

Homework sheet

Choose the correct answer:

1. **There are between particles of the soil which contain………….and air.**

a. water – plants b. humus - animals

c. pore spaces - water d. dead plants - dead animals

2. **When the soil contains large amount of sand particles, the flow of water will**

a. not change, b. increase. c. decrease. d. stop.

3……………….soil contains large amount of sand particles.

a. Sand b. Silt c. Clay d. Fertile

4**. The soil that retains medium amount of water becomes**…………

a. more fertile b. less fertile. c. unsuitable for planting. d. very dry.

5. Silt soil contains…………………particles and its color is …………………

a. large - yellow. b. medium – dark.

c. large - dark. d. medium - gray.

6. Clay soil allows water to flow……………as it has…………………pore spaces between its particles.

a. fast-small b. slow-large c. slow-small d. fast-large

7. **The ability of........................... soil to retain water is larger than soil.**

a. silt-clay b. clay-silt c. sand-silt d. sand-clay

8. The color of sand soil is……………

a. yellow. b. gray. c. black. d. red

9. ……………soil holds water well so, it becomes………..most of time.

a. Sand-wet b. Clay-wet clay -dry d. Silt-dry

Give reasons for:

1. The soil that retains medium amount of water is more fertile

………

2. Clay soil can retain more amounts of water and air

………

Soil Impact the Earth system

Poor agricultural practices have many impacts on the soil such as:

Deplete the soil	Desertification
Due to :- - Converting fertile agricultural lands (arable lands) into cities, factories and pastures. - Over use of pesticide - Air and water pollution	It is a process by which the land becomes infertile due to deforestation, drought or overgrazing

1. Nearly half of the agricultural soil on the Earth has been lost in the last **150 years**.

2. The desert area around the world increasing very quickly, as about **38%** of Earth's land becomes **very dry and exposed to desertification.**

Soil Restoration

1. Adding Crop remains (residues) like: straw and stems (stalks). (**add nutrients**)
2. Adding Natural fertilizers like: animals manure.
3. Planting different types of crops and rotating them with crops that keep the soil fertility. **(crop diversification)**

Factors affecting crop quality:

1. Regular and moderate irrigation.
2. Adding suitable amount of organic

Unsuitable environmental factors lead to

1. Producing weak plant
2. Reducing amount of crops
3. Spread plant diseases among crops

Reducing Soil erosion

Erosion process of soil:

Speed of moving water increases.

The soil particles are washed down by moving water.

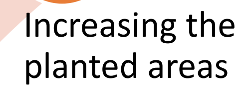
Ways to reduce the soil erosion process:



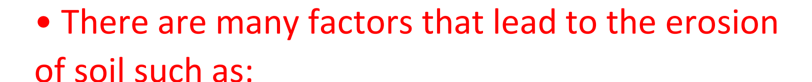


Adding sand and silt to the soil

Digging canals to collect the excess water in the soil



Increasing the planted areas



- There are many factors that lead to the erosion of soil such as:

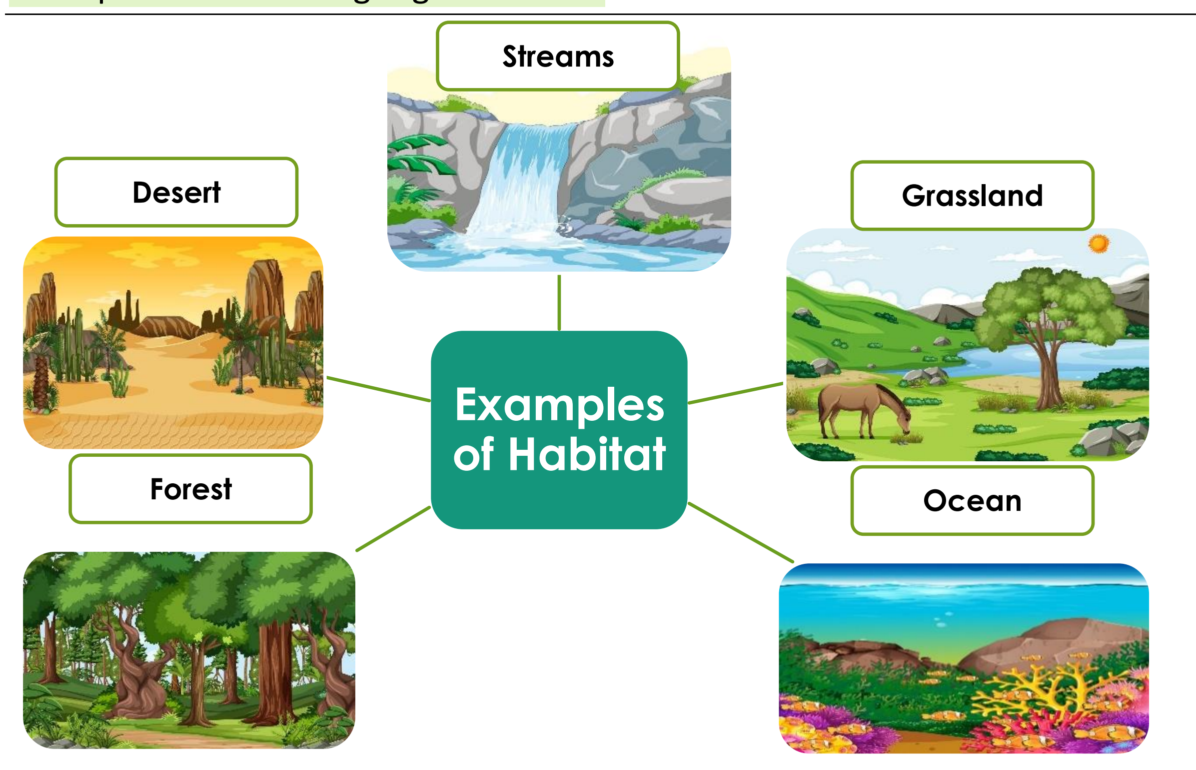
  - The type of soil
  - Removing plants.
  - Increasing the amount of water.
  - Increasing the inclination (slope) of the Earth's surface.

Climate and habitat destruction

Natural processes and human activities that can lead to habitat destruction and changing the climate

Habitat:

It is a place where living organisms live.



- All habitats provide four important things for living organisms, which are:

-Food. -Water. -Shelter. - Space to live.

Notes

1. In any habitat, when one of the previous four things is **depleted** or **taken away**, this causes habitat destruction.
2. Any change in habitat may cause large reaction from nature

Habitat Destruction

Natural Changes

- Hurricanes.
- Fires.
- Floods.
- Volcanic eruptions.
- Destructive earthquakes.

Diseases of living organisms

- Lack of food for many living organisms.

Human activities

- Building factories to produce goods.
- Building house
- Construction of infrastructure such as roads and railway tracks for the transportation of both people and materials





1 Deforestation:

Due to building factories and homes on natural land (Hills, prairies and valleys)

2 Land destruction:-

- Because they used it in for mining, making road and airport runways.

3 Increase in the carbon dioxide & increase in the Earth's temperature

Due to pollution



Although natural changes can cause habitat destruction, but they may have some benefit such as:

Natural changes	Its benefit
Volcanic eruptions:	Make the soil fertile.
Forest fires:	Release seeds from closed fruits (sealed pods).
Diseases of living organisms:	Keep populations of animals to a suitable number that can be controlled in an ecosystem.

Climate change:

- Human activities can cause **habitat destruction** which make climate change.
- The climate change may lead to **extinction** of living organisms where:

Humans cause increasing the rate of the climate change on the Earth.

↓

This rate leads to the changes of habitats which all living organisms depend on.

↓

Living organisms change their behaviors to adapt to their new habitats.

- Sometimes living organisms can't adapt or move in new conditions and this leads to their extinction.

Overpopulation

Too much **increase** in the number of a certain species of living organisms in an ecosystem.

Overpopulation

Due to Natural changes

When large predators disappear from an area

↓

The number of preys increases

↓

The food resources decrease (food, water, etc.)



Sometimes humans do the same damage in invasive species??
due to overpopulation of human

Due to Human activities

When new species are brought by humans into an area

↓

It became invasive species

↓

The invasive species kill off Native plants and animals that already live in this area.

Example

Lion fish



- **In some areas of the Red Sea, lionfish are the reason for the loss of 79% of young fish of the native species population.**

Worksheet

Complete the following sentences:

1. To reduce the erosion process ....areas should be increased.
2.Increasing the inclination of Earth's surface leads to the increase......................... process of the soil.
3. The land becomes infertile due to..........., drought or................which causing desertification.
4. Overuses of................ And cause depletion of the soil.
5. Adding some crop remains like   and..................help in soil restoration.
6. Adding sand and..................... to the soil helps in decreasing the effect of moving over the soil.

Give reasons for:

1. The increase in the inclination of Earth's surface causes the erosion of the soil
....

2. Scientists and farmers should use crop remains like straw and stem in the soil.
....

What happens to...?

1.The soil when farmers increase the planted areas.
....

Classify the following activities into natural activities and human activities that lead to habitat destruction:

(Hurricanes - Floods - Building houses - Destructive earthquakes -Making road and airport runways)

Natural activities	Human activities

Homework sheet

Choose the correct answer:-

1. Overuse of……….and……….are from the reasons of soil depletion.

a. water - air b. air – fertilizers

c. pesticides - chemical fertilizers d. water - pesticides

2. Deforestation ………… or overgrazing cause the increase of the …………………of the land.

a. drought - fertility

b. drought - infertility

c. increasing the amount of water - desertification

d. fertilizers - desertification

3 ………….and………………. are from the ways of soil restoration.

a. Adding nutrients to the soil - deforestation

b. Overuse of pesticides - water pollution

c. Overgrazing - planting different types of crops

d. Adding nutrients to the soil - planting different types of crops

4. Increasing the inclination of the Earth's surface leads to………….

a. increase the crop quality. b. decrease the soil erosion,

c. increase the soil erosion. d. decrease the crop quality.

5. To reduce the erosion process, we should follow all the following ways, except……………………………………………………..

a. increasing the planted areas.

b. digging canals or trenches to collect the excess water in the soil.

c. adding sand and silt to the soil.

d. increasing the inclination of the Earth's surface.

6.Habitat destruction could happen due to……………………

a. natural changes only. b. human activities only.

c. natural changes and human activities.

d. overpopulation and increasing the green areas.

7- The change in climate leads to the…………….of some living organisms.

a. increase b. extinction c. reproduction d. pollution

8- ………….is from the invasive species that are found in the Red Sea.

a. Emperor penguin b. Poison dart frog c. Lionfish d. Lizard

Give reasons for:

1.Desertification process increases recently.

……



Reducing water pollution

Apply law to prevent water pollution



1. Treatment of sewage and industrial water.
2. Keeping green areas
3. Using suitable amounts of fertilizers
4. Getting rid of trash in correct ways
5. Using soil fences and sedimentation ponds.
6. Controlling air pollution that produced from cars and industry



Preventing water pollution is more effective than cleaning up pollution from water

•Human like all living organisms need shelter to survive, but the processes of making building materials can cause pollution which damages the environment.



Harms of traditional bricks:

- The bricks must be burned at more than 1000°C.
- The ingredients of cement must be burned at 1450°C.

• So, the manufacture of bricks and cement require a lot of energy and produce a lot of pollution.

Using soil to build sustainable homes:

• Scientists transform **soil** into **building materials where** they add chemicals to the soil that turn the clay of soil into substance look like glue which binds the materials together.

• In this process, the scientists **don't use the topsoil which** is used for agriculture, but they use the **subsoil** which is found beneath (under) the topsoil that is available around the Earth.
new substance is used to build sustainable homes instead of traditional bricks



Worksheet

Complete the following sentences:

1. To reduce water pollution we have to keep green areas, and treat……………….and industrial water.

2.Soil scientists hope to stop using………..bricks and…………..which are used in building houses.

3.To produce traditional bricks and cement, a lot of……………is required and a lot of……………is produced.

4. The glue-like substance which is used to bind building materials together is formed by the…………….change of the……………….

5. Engineers used the glue-like substance to build………….homes instead of .... bricks.

Choose the correct answer:

1. Treatment of sewage water and reduce the amount of fertilizers help in……………………………

a. increasing air pollution. b. increasing water pollution.
c. increasing soil pollution. d. decreasing water pollution.

2. The part of the soil which is used to make glue-like substance that bind the materials together is…………………

a. topsoil only. b. subsoil only.
c. topsoil and subsoil. d. topsoil and groundwater.

3. Soil scientists and engineers hope to stop depending on traditional bricks and concrete because they……………………

A .require a lot of energy only.
B .produce a lot of pollution only.
C .require less energy and produce a lot of pollution.
d- require a lot of energy and produce a lot of pollution.

4. ……………and……………are from the ways to reduce water pollution.

a. Treatment of sewage water - increasing air pollution
b. Using soil fences - keeping green areas
c. Using a large amount of fertilizers - controlling air pollution
d. Getting rid of trash in rivers - keeping green areas